UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II

In the Matter of the	
FORD INTERNATIONAL SERVICES, INC. Ringwood Mines/Landfill Site (Ringwood, New Jersey)	ADMINISTRATIVE ORDER
Respondent,	Index No. II-CERCLA-70101
Proceeding Under Section 106(a) of the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §9606(a), as amended by the Superfund Amendments and Reauthorization Act of 1986, Public Law 99 - 499.	

JURISDICTION

The following Administrative Order ("ORDER") is issued to Ford International Services, Inc. ("Respondent") by the United States Environmental Protection Agency ("EPA") pursuant to Section 106(a) of the Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA"), as amended by the Superfund Amendments and Reauthorization Act of 1986 ("SARA"), 42 U.S.C. §9601 et seq., for which authority was delegated to the Administrator of EPA by the President of the United States by Executive Order 12580 on January 23, 1987 and redelegated to the Regional Administrator of EPA Region II. Pursuant to Section 106(a) of CERCLA, 42 U.S.C. §9606(a), the State of New Jersey Department of Environmental Protection ("NJDEP") has been notified of the ORDER.

FINDINGS OF FACT AND CONCLUSIONS OF LAW

1. The Respondent, is a "person" as defined in Section 101(21) of CERCLA, 42 U.S.C. §9601(21), is a past owner/operator of the Ringwood Mines/Landfill Site (the "Site"), which is a facility as defined in Section 101(9) of CERCLA, 42 U.S.C. §9601(9), and is a responsible party within the intent of Section 107(a) of CERCLA, 42 U.S.C. §9607(a).

2. The Site is on the National Priorities List ("NPL"), 40 C.F.R. Part 300, Appendix B, of known and threatened releases, which has been issued pursuant to Section 105(8)(B) of CERCLA, 42 U.S.C. §9605(8)(B).

3. Respondent (formerly known as Ford International Studies, Inc. and Ringwood Realty Corp.) acquired certain properties ("the Site") in the Ringwood, New Jersey area from Pittsburgh Pacific Company on January 7, 1965. Respondent owned these properties until it transferred title to the properties in several transactions as set forth below:

Deed Date	Acreage	Grantee
11/21/69	87.310	High Point Homes, Inc.
5/14/70	207.97	Public Service Electric and Gas Co.
6/7/70	18.584	High Point Homes, Inc.
11/2/70	289.89	Ringwood Solid Waste Management Authority
11/13/70	122.039	High Point Homes, Inc.
12/21/73	109.249	New Jersey Department of Environmental Protection
12/21/73	35.475	The Housing Operation With Training Opportunity, A New Jersey Corporation Not for Profit

4. The Site has been used for the disposal of solid and chemical waste which contained hazardous substances. The Site comprises several waste disposal areas, including: open dumps, landfills, abandoned mine shafts and pits which were used for the disposal of municipal and industrial wastes including, but not limited to, paint sludge.

5. The hazardous substances referred to in this ORDER shall mean any substances included within the definition of "Hazardous Substance" in Section 101(14) of CERCLA, 42 U.S.C. §9601(14).

6. Groundwater is the major source of drinking water in Ringwood Borough. Potable water is provided through a municipal distribution system that utilizes bedrock wells and an artesian spring and private commercial/residential wells located adjacent to the Site.

7. The Site is located within the watershed of the Wanaque Reservoir which supplies drinking water to approximately 65,000 people. Surface water draining the Site, after mixing with water from other sources, discharges to the Wanaque Reservoir approximately one mile south of the Site. There are no drinking water intakes from the Reservoir within three miles of the Site.

8. Pursuant to Section 3013 of RCRA, 42 U.S.C. §6934, an Administrative ORDER on Consent ("ACO") was issued on March 16, 1984 by EPA Region II, whereby a Remedial Investigation ("RI" or "the Study") for the Site was funded by Ford International Services, Inc. and performed by its consultant, Woodward-Clyde Consultants ("WCC").

9. In a letter dated January 12, 1987, EPA acknowledged completion of the RI and satisfaction of the RCRA Section 3013 ACO.

10. The RI for the Site was divided into three phases. The purpose of Phase I was to collect all existing data on the Site, consult the scientific literature and produce some geologic and structural mapping of the area. A work plan for the Phase II investigation was produced from this effort. The Phase II investigation consisted of geophysical work, test pit excavations, monitoring well installations, and sampling from test pits, monitoring wells, surface water and seeps.

11. After reviewing the Phase II Report, EPA requested an additional round of surface water sampling and subsequently some additional work pursuant to a Phase III work plan.

12. The results of the Phase II and Phase III activities revealed that in the Test Pits the concentrations of hazardous substances were as high as: Barium, 700 parts per billion ("ppb"); Cadmium, 130 ppb; Lead, 560 ppb, and Aliphatic Hydrocarbons, 20 ppb.

13. Surficial paint sludge disposal areas were investigated for the Respondent by Woodward Clyde Consultants in March and April 1987. The total volume of surficial sludge is estimated at 6,300 cubic yards.

14. Ten (10) sludge samples were collected from ten (10) exploratory pits within the four (4) sludge disposal locations. EP Toxicity leachate analysis revealed lead values ranging from 6.8 mg/l to 178 mg/l. In accordance with 40 C.F.R. §261.24, the maximum allowable concentration for lead is 5.0 mg/l. As a result, the sludge will be classified as a hazardous waste, EP Toxic for lead.

15. Priority pollutant analysis of the sludge samples revealed contamination consisting of hazardous substances. Following is a partial list of detected hazardous substances and their highest detected value in parts per billion ("ppb"):

Napthalene	350,000 ppb
Bis(2-ethylhexyl) phtalate	380,000 ppb
Toluene	610,000 ppb
Ethylbenzene	810,000 ppb
M-xylene	8,200,000 ppb
O,P-xylene	8,300,000 ppb

2-Methylnapthalene	140,000 ppb
Tetrachloroethylene	95,000 ppb
Trichloroethylene	140,000 ppb
Lead	310,000 ppb

16. Sampling of the groundwater monitoring wells adjacent to the disposal areas indicated the presence of the following hazardous substances in certain of the wells:

Arsenic	15 ppb
Barium	530 ppb
Mercury	.6 ppb
Lead	764 ppb
Thallium	100 ppb
Toluene	36 ppb
Chlorinated Hydrocarbons	3,135 ppb

17. Access to the waste disposal areas including the open dumps, landfills, pits and the paint sludge is not restricted to the public.

18. Some of the aforementioned hazardous substances found in the paint sludge and monitoring wells including, but not limited to, napthalene, lead, tetrachloroethylene, xylene and toluene may cause adverse health effects in human beings from exposure by inhalation, ingestion or direct contact.

19. EPA recognizes that the public interest is served by this ORDER.

20. Respondent has had an opportunity to confer with EPA and to state any objections Respondent may have had with respect to the contents of this ORDER.

DETERMINATION

Upon the basis of the foregoing FINDINGS OF FACT AND CONCLUSIONS OF LAW and the entire administrative record, the Regional Administrator, EPA Region II, has determined that the release and threat of release of hazardous substances into the environment from the Site may present an imminent and substantial endangerment to human health and/or the environment within the meaning of Section 106(a) of CERCLA, 42 U.S.C. §9606(a). The Regional Administrator has further determined that Respondent is qualified within the meaning of 104(a) of SARA to conduct the work called for under this ORDER, which the Regional Administrator deems reasonable to ascertain the nature and extent of such hazard.

ORDER

Based on the FINDINGS OF FACT AND CONCLUSIONS OF LAW and the DETERMINATION set forth above, and pursuant to Section 106(a) of CERCLA as amended by SARA, 42 U.S.C. §9606(a), it is hereby Ordered that the Respondent shall undertake a Feasibility Study ("FS") for the Site in accordance with the requirements specified below. The purpose of this FS is to develop and evaluate remedial alternatives for the Site. All activities shall be completed as soon as possible even though maximum time periods for their completion may be specified in this ORDER or in the EPA approved work plans.

I. Feasibility Study

A. Respondent has submitted for EPA review and approval a draft work plan for a Feasibility Study ("FS Work Plan"), attached as Appendix A. The FS Work Plan shall conform with 40 C.F.R. §300.68 (a)-(j) and with EPA's current Guidance on Feasibility Studies Under CERCLA, or in the absence of such guidance with EPA's "Guidance on Feasibility Studies under CERCLA, April 1985," as updated and superseded by the statutory requirements of SARA. The FS Work Plan shall include a schedule for the performance of the specified tasks. EPA will review and comment on the FS Work Plan. Within twenty-one (21) days of Respondent's receipt of EPA's comments, Respondent shall amend the FS Work Plan as required by those comments, or as otherwise approved by EPA, and shall submit the amended document to EPA. When EPA determines that the FS Work Plan, as amended by EPA's comments, is acceptable, EPA shall transmit to Respondent a written statement to that effect.

B. Information on the site background, the nature and extent of the problem, and previous response activities presented in the Phase I, Phase II and Phase III investigation reports, and the paint sludge sampling results, which constitute the RI report ("RI Report"), may be incorporated by reference in the FS. To the extent that any further study activities are required, Respondent may confer with EPA concerning those activities. If Respondent refuses to perform the activities promptly, subject to EPA review and approval, EPA reserves its rights to issue any further orders as necessary.

C. Respondent shall perform the Feasibility Study ("FS") in conformance with the EPA Approved FS Work Plan, pursuant to the schedule set forth in the FS Work Plan. Respondent shall submit to EPA for review an interim FS Report ("Interim FS Report") which shall include the recommended remedial alternative(s). EPA will review and comment in writing on the Interim FS Report.

D. Within 30 days of receipt of EPA's comments on the the Interim FS Report, Respondent shall amend that report to conform with the comments and shall submit the amended report to EPA for approval.

If EPA finds that additional evaluations are necessary, Respondent shall perform them in accordance with both EPA approved specifications and a written performance schedule. The amended report shall constitute the "Draft FS Report" and shall be submitted for publication pursuant to Paragraph E below.

E. Following submittal of the Draft FS Report, EPA will announce to the public the availability of both the RI Report and the Draft FS Report for review and comment. EPA policy and guidance in effect at the time the public comment period is initiated shall be followed. Following the public comment period (which may involve both written and oral comments), EPA will determine if the reports should be modified or accepted as submitted, and EPA will notify the Respondent in writing.

F. Within 30 days of the close of the public comment period, Respondent shall prepare a Final FS Report which incorporates EPA's comments and responds to the comments and criticisms submitted by the public in written or oral presentations to both the RI and the FS. The Final FS Report will indicate the changes from the Draft FS and the reasons for any such change.

G. EPA remains the final arbiter in any dispute regarding the sufficiency of the FS Work Plan, the Draft FS Reports and the Final FS Report, and EPA may modify them unilaterally.

H. EPA shall make the final selection of the remedial alternative(s) to be implemented. The parties shall meet and discuss the remedial alternatives prior to EPA's final selection.

II. Reporting

A. Respondent shall submit a progress report to EPA on the tenth day of every month, for the preceding month, following the effective date of this ORDER. The progress report shall develop a chronological record of Site activities.

B. Respondent shall provide EPA or its designated representative with duplicate and/or split samples of any samples collected in furtherance of study activities performed with respect to the Site.

C. Respondent shall give EPA three (3) working days advance notice of on-site and off-site sampling activities, if any.

D. All data and information, including raw sampling and other monitoring data, generated by Respondent or on behalf of Respondent, shall immediately be made available to EPA or its designated representatives. No such data or information shall be destroyed without the express written approval of the Office of Regional Counsel, Region II, and all such data and information shall be preserved for at least eight years.

E. All records prepared or compiled by Respondent and delivered to EPA in the course of implementing this ORDER shall immediately be available to the public unless identified as confidential by Respondent in conformance with SARA and with 40 C.F.R., Part 2. Records so identified shall be treated as confidential only in accordance with SARA and the applicable confidentiality regulations. Sampling and other monitoring data, and hydrological and geological information, may not be considered confidential. EPA may release all records to NJDEP. NJDEP may make those records available to the public unless Respondent conforms with appropriate New Jersey law and regulations regarding confidentiality.

F. The original and one copy of all submittals required from Respondent under the terms of the ORDER to be submitted to EPA shall be sent by certified mail, return receipt requested to:

Chief, Site Compliance Branch
Emergency and Remedial Response Division
U.S. Environmental Protection Agency
26 Federal Plaza
New York, New York 10278

Attention: Patricia Wells, Ringwood Mines/
Landfill Site Project Officer

One copy of all such writings shall be transmitted by certified mail, return receipt requested to:

Chief, New Jersey Superfund Branch
Office of Regional Counsel
U.S. Environmental Protection Agency
26 Federal Plaza
New York, New York 10278

Attention: Beverly Kolenberg, Esq.

Three copies of all such writings shall be transmitted by certified mail, return receipt requested to:

Edgar Kaup
Professional Engineer
New Jersey Department of Environmental Protection
Division of Waste Management
HSMA
CN-028
Trenton, New Jersey 08625

III. EPA Communications and Decisions

A. Written communications from EPA to Respondent shall be sent by certified mail, return receipt requested to:

Jerome S. Amber
Principal Staff Engineer
15201 Century Drive
Suite 608
Dearborn, Michigan 48120

Norman Bernstein
Associate Counsel
Ford Motor Company
World Headquarters, Room 1121
Dearborn, Michigan 48121

Dr. Melvin Esrig
Vice President
Woodward-Clyde Consultants
201 Willowbrook Blvd.
Wayne, New Jersey 07470

B. Decisions by EPA relating to this ORDER, such as approvals, disapprovals, grants or denials of requests for extensions of time and requests for modifications of reports, work plans, specifications, schedules, and work outputs shall be communicated in writing to Respondent by Chief, Site Compliance Branch, U.S. Environmental Protection Agency, 26 Federal Plaza, New York, New York 10278.

C. No informal advice, guidance, suggestions or comments by EPA or NJDEP regarding reports, plans, specifications, schedules or any other writings submitted by Respondent shall be construed as relieving Respondent of its obligation to obtain the formal approvals which may be required by this ORDER.

IV. Respondent's Designated Coordinator and EPA Inspection Authority

A. Within fifteen (15) days of the effective date of this ORDER, Respondent shall provide EPA with the name, title, address, phone number and qualifications of its Designated Coordinator, who shall be responsible for the coordination and the implementation of this ORDER and all the activities required herein.

The Designated Coordinator shall have the necessary technical expertise to coordinate all aspects of the work contemplated by this ORDER. Counsel for Respondent shall not be eligible to be the Designated Coordinator. Respondent shall make available to the Designated Coordinator all correspondence and other writings from EPA. Respondent shall have the right to change its Designated Coordinator at any time. However, Respondent shall notify EPA in writing at least five working days prior to any such change. If such advance notice is not feasible, notice shall be given by the best means and as promptly as possible.

B. All employees and agents ("Agents") of the Respondent, who engage in activities pursuant to this ORDER, shall, upon reasonable request, cooperate with EPA for any purpose related to investigations, response action and/or enforcement proceedings conducted with respect to the Site. All contracts between the Respondent and its consultants and contractors shall specifically provide for the Agents' availability and cooperation with EPA.

C. EPA and EPA's designated representatives, including but not limited to their employees, agents, contractors and consultants, and including the EPA designated on-scene coordinator and/or EPA Project Manager shall have authority to observe any work being carried out on the site and off-site by Respondent, for the purposes of inspecting and observing Respondent's progress in implementing any requirements of this ORDER, or for the purpose of verifying the data concerning such implementation submitted to EPA by Respondent. To the maximum extent possible, Respondent shall permit such persons to inspect and copy all writings (including all data in any way pertaining to work undertaken pursuant to this ORDER). Respondent shall not be required to permit anyone who is not bound by EPA's confidentiality regulations to inspect or copy any writing which is entitled to confidential treatment pursuant to paragraph II.E. herein. Notwithstanding the above, EPA hereby retains all its inspection authority under CERCLA and the Resource Conservation and Recovery Act, 42 U.S.C. §6901 et seq. Any EPA contractor and its representatives shall be eligible to be designated representatives of EPA under this paragraph.

V. Enforcement Actions

A. In the event that Respondent fails to adhere to any requirement of this ORDER; or, notwithstanding compliance with the terms of this ORDER, upon the occurrence or discovery of a situation in which EPA would be empowered to take any further response action, including but not limited to removals, and/or interim remedial actions; or in the event of a release or threatened release not addressed by this ORDER; or upon the determination that action beyond the terms of this ORDER is necessary to abate an imminent and substantial endangerment to the public health or welfare or the environment that may be posed by this Site; or under any

other circumstances authorized by law and not inconsistent with the terms of this ORDER, EPA may institute federally funded response activities and subsequently pursue cost recovery actions available, and/or EPA may issue orders to Respondent pursuant to available statutory authority. EPA will advise Respondent if EPA alters or in any way modifies Respondent's obligations under this ORDER as a result of any actions undertaken by EPA or its representatives.

B. Nothing herein shall preclude EPA from taking any additional actions as it may deem necessary for any purpose, including the prevention or abatement of an imminent and substantial endangerment to the public health, welfare, or the environment arising from conditions at the Site.

C. Failure of the Respondent expeditiously and completely to carry out the terms of this ORDER may result in EPA taking the required actions unilaterally, pursuant to Section 104(a)(1) of CERCLA, 42 U.S.C. §9604(a)(1), and bringing an action against the Respondent pursuant to Section 107 of CERCLA, 42 U.S.C, §9607, for the recovery of costs incurred by the EPA.

D. EPA reserves its right to bring an action against Respondent pursuant to Section 107 of CERCLA, 42 U.S.C. §9607, for recovery of any costs incurred in oversight of Respondent's implementation of this ORDER, and for any other costs incurred by EPA in connection with investigative or response activities at the Site, including all costs associated with EPA's performance of the RI/FS or any part thereof, if Respondent fails to complete properly the RI/FS in conformance with the requirements of this ORDER.

E. Notwithstanding any other provision of the ORDER, EPA reserves the power to take enforcement actions, including actions for monetary penalties, for any violation of law or this ORDER. Such enforcement actions may include, though need not be limited to, actions pursuant to Section 106(b) of CERCLA, 42 U.S.C. §9606(b), seeking up to $25,000 per day in penalties for any willful violation or any failure or refusal of Respondent to comply with this ORDER or any portion of it. Failure to comply with this ORDER or any portion hereof without sufficient cause also may subject Respondent to an action under Section 107(c)(3) of CERCLA, 42 U.S.C. §9607(c)(3), for punitive damages in the amount of three times the total of all costs incurred by the government as a result of Respondent's failure to comply.

VI. Reimbursement

A. EPA shall submit to the Respondent an accounting of all oversight and response costs incurred by the U.S. Government, whether such oversight or response is performed by EPA or by a contractor selected by EPA, with respect to work associated with the RI and FS performed by Respondent. Within 30 calendar days of receipt of that accounting, the Respondent will remit a check for the amount of those costs made payable to the Hazardous Substance Superfund, pursuant to Section 107 of CERCLA as amended by SARA, 42 U.S.C. §9607. Checks should specifically reference the identity of the Superfund site and the docket number of this ORDER. Payment should be sent to:

U.S. Environmental Protection Agency
Region II
Regional Hearing Clerk
P.O. Box 360188M
Pittsburgh, PA 15251

A letter of explanation shall accompany the payment; a copy of the letter shall be sent to the Chief, Site Compliance Branch, EPA Region II.

VII. General Provisions

A. This ORDER shall become effective on the date on which it is received by the Respondent.

B. All work conducted pursuant to this ORDER shall be performed in accordance with prevailing professional standards.

C. All actions performed by Respondent in implementing this ORDER shall be in compliance with all applicable, relevant and appropriate federal, state, and local laws, regulations and requirements including, but not limited, to the National Contingency Plan found at 40 C.F.R. Part 300 (exclusive of the cost balancing provisions of Title 40 C.F.R. §300.68(k)). Respondent shall be responsible for obtaining all necessary permits, licenses and other authorizations.

D. Nothing herein shall constitute or be construed as a satisfaction or release from liability with respect to any conditions or claims arising as a result of past ownership, or use of the Site by Respondent, its agents, contractors, lessees, successors, or assigns.

E. All reports, work plans and other writings required under the terms of this ORDER, upon approval by EPA, are incorporated into this ORDER.

F. Neither the United States Government nor any agency thereof shall be liable for any injuries or damages to persons or property resulting from acts or omissions of Respondent, its officers, directors, employees, agents, servants, receivers, trustees, successors, or assigns, or of any persons, including but not limited to firms, corporations, subsidiaries, contractors or consultants, in carrying out activities pursuant to this ORDER, nor shall the United States Government nor any agency thereof be held out as a party to any contract entered into by Respondent in carrying out activities pursuant to this ORDER.

G. This ORDER shall apply to and be binding upon Respondent and Respondent's contractors, receivers, trustees, successors, and assigns and upon all persons, including but not limited to firms, corporations, subsidiaries, contractors and consultants, acting under or for Respondent.

H. Nothing in this ORDER constitutes a decision on preauthorization of funds under Section 111(a)(2) of CERCLA, 42 U.S.C. §9611(a)(2), or any authorization for the Respondent, its agents, contractors, successors or assigns, to assert any claim(s) against or to request any reimbursement from the Hazardous Substance Superfund, pursuant to Sections 111 or 112 of CERCLA, 42 U.S.C. §9611 and §9612, or under any other provision CERCLA or based on common law, statutory or equitable grounds.

I. Respondent's activities under this ORDER shall be performed within the time limits set forth herein, or otherwise established or approved by EPA, unless performance is delayed by events which constitute a force majeure. For purposes of this ORDER, a force majeure is defined as any event arising from causes beyond Respondent's control, to the extent that they could not have been prevented or minimized by Respondent's conduct. Financial considerations shall not be considered circumstances beyond the control of Respondent. In the event of a force majeure, Respondent shall be obligated to perform the affected activities within a time period which shall not exceed the time period of delay attributed to the force majeure; provided, however, that no deadline shall be extended beyond a period of time that is reasonably necessary. In the event that there is a dispute about whether any delay results from circumstances beyond the control of Respondent, the burden of proof shall be on the Respondent. Moreover, Respondent shall verbally notify EPA's Project Manager as soon as possible that circumstances constituting a force majeure have occurred or are likely to occur.

In addition, Respondent shall notify EPA in writing, over the signature of a responsible official, as soon as possible but not later than five (5) days after Respondent becomes aware that circumstances constituting a force majeure have occurred. Such

written notice shall be accompanied by all available pertinent documentation including, but not limited to, third-party correspondence, and shall contain the following: (1) a description of the circumstances, and the reasons such circumstances are beyond Respondent's control; (2) the actions (including dates) that Respondent has taken and/or plans to take to minimize any delay (3) the date by which or the time period within which Respondent proposes to complete the delayed activities. Respondent's failure to notify EPA in a timely manner, as required by this paragraph, shall render the remaining provisions of this paragraph null and void insofar as they may entitle Respondent to an extension of time.

J. Respondent shall use its best efforts to avoid or minimize any delay or prevention of performance of its obligations under this ORDER. Respondent shall provide written notification to EPA of any circumstances which have caused or which Respondent believes are likely to cause a delay in performance. Such written notice: (1) shall be provided as soon as possible, but not later than five (5) days after the date when Respondent knew or should have known of the occurrence of such circumstances; (2) shall be accompanied by all available documentation, including but not limited to third-party correspondence; and (3) shall include (a) a description of the circumstances causing or potentially causing the delay; (b) the actions (including pertinent dates) that Respondent has taken and/or plans to take to minimize any delay; and (c) the date by which or time period within which Respondent proposes to complete delayed activities. Such notification does not relieve the Respondent of any obligation under this ORDER.

K. This ORDER may be amended; any amendments shall be in writing and shall become effective on the date they are received by Respondent.

IT IS SO ORDERED:

U.S. ENVIRONMENTAL PROTECTION AGENCY

CHRISTOPHER J. DAGGETT
Regional Administrator
U.S. Environmental Protection Agency
Region II

June 26, 1987
Date of Issuance

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APPENDIX

WORK PLAN FOR
FEASIBILITY STUDY
RINGWOOD MINES/LANDFILL SITE
RINGWOOD, NEW JERSEY

Prepared for:

FORD INTERNATIONAL SERVICES, INC.
Dearborn, Michigan

84C4084-51

March 1987

Prepared by:

WOODWARD-CLYDE CONSULTANTS
201 Willowbrook Boulevard
Wayne, New Jersey 07470

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SECTION 1
INTRODUCTION

1.1 PURPOSE

Ford International Services, Inc. ("Services") has requested Woodward-Clyde Consultants (WCC) to prepare a work plan to conduct a Feasibility Study (FS) for the Ringwood Mines/Landfill site. The Ringwood site is located in Ringwood Borough, Passaic County, New Jersey, and is ranked on the National Priorities List (NPL).

The Remedial Investigation (RI) for the Ringwood Mines site was completed per USEPA's letter dated 12 January 1987 (see Section 1.2 below). The RI has shown that: the site has scattered occurrences of low levels of priority pollutants; the site is not highly contaminated; and the site does not pose an immediate threat to human health or the environment. Despite these findings, USEPA has requested that further study be undertaken for the following reasons:

- To assess and evaluate site-related exposure;
- To evaluate public health impacts attributable to the site; and
- To select cost-effective, feasible remedial action alternative(s)[1] that provide adequate public health and environmental protection.

"Services" has asked WCC to address the third bulleted item by means of a Feasibility Study for the Ringwood Mines site. The FS work plan has been designed by WCC to meet the requirements of a Feasibility Study under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments Reauthorization Act of 1986 (SARA).

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(1) The term "remedial action alternative" as used in this work plan includes a possible no action alternative.

This work plan assumes that the "Work Plan for Removal and Disposal of Paint Sludge at Ringwood Mines Landfill Site," separately prepared by Woodward-Clyde Consultants, is implemented.

WCC has identified nine tasks which will be undertaken and integrated to produce a well-documented and defensible comparison of the most cost-effective and feasible remedial action alternatives. Task 1 is the development of the FS work plan, to precede the technical FS Tasks 2 through 8. Task 0 encompasses all administrative subtasks, and will run concurrently with all technical tasks.

The technical activities are described in detail in Section 2 of this work plan. Project schedule and deliverables are outlined in Section 3.

1.2 BACKGROUND

WCC has been investigating potential water and soil contamination at the Ringwood Mines/Landfill site. The investigations were conducted in three discrete efforts: Phase I, Phase II and Phase III. The Phase I study involved obtaining background information necessary to generate a site specific work plan for the Phase II investigations. The Phase II study was conducted in a sequence of tasks which progressed as follows:

- site specific health and safety plan,
- organic vapor survey,
- conductivity survey,
- resistivity soundings,
- test pit excavations,
- monitoring well installation,
- geophysical well logging of deep monitoring wells,
- monitoring well sampling,
- packer testing of deep monitoring wells, and

- surface water and seep sampling (performed independently of other tasks).

The Phase II results were submitted to the USEPA, in December 1984, in the document entitled "Final Report Phase II Investigations, Ringwood Mines/Landfill Site". A second round of sampling was conducted during April 1985, and the results were submitted to the USEPA in a report entitled "Second Round Surface Water Quality Sampling, Ringwood Mines, New Jersey".

At the request of USEPA, additional field investigations were undertaken in the spring of 1986 as Phase III. The Phase III results were submitted to the USEPA, in September 1986, in the document entitled "Phase III Investigations of the Ringwood Mines/Landfill Site, Ringwood, New Jersey". The USEPA requested a meeting with representatives from "Services", NJDEP and WCC on 2 December 1986. One outcome of the meeting was the USEPA's request for a work plan to conduct a Feasibility Study of the site. On 12 January 1987, USEPA advised "Services" that the Phase I, II and III Investigations satisfied the terms of the Administrative Order (on Consent) and satisfied the requirements for the Remedial Investigation.

SECTION 2
TECHNICAL ACTIVITIES

2.1 APPROACH

This work plan describes the scope of services for the Feasibility Study (FS) to be conducted for the Ringwood Mines/Landfill Site, Ringwood, New Jersey. The FS will be performed according to guidance documents issued by the U.S. Environmental Protection Agency (USEPA), and, as such, will be patterned after the methods and procedures developed under the revised National Oil and Hazardous Substances Contingency Plan of 20 November 1985. The FS will complement and build upon the Remedial Investigation (RI) performed by WCC for the Ringwood Mines site, and on the baseline Risk Assessment to be conducted by Environ Corporation of Princeton, New Jersey. The Risk Assessment will identify risks posed by the site, if any, to human health and the environment, and will assist in establishing the site-specific remediation objectives for the FS.

The purpose of the FS is to develop a set of appropriate and technically feasible remedial alternatives for the site, and to recommend cost-effective remedial alternatives that provide adequate public health and environmental protection. The overall approach of the FS is displayed in the process flow diagram in Figure 2-1. Task 1 of the study includes development of this work plan and related activities. The FS per se is subdivided into Tasks 2 through 8, and all management activities are grouped under Task 0. These tasks have been organized as shown below:

Task	Activities	Products
0	Project management	Project files; progress reports; schedule compliance
1	Preparation and revision of work plan	Approved work plan
2	Identification of general response actions	Set of general response actions appropriate to site problems
3	Technology screening; Synthesis of technologies	Potentially feasible remedial alternatives
4	Quantitative evaluation of remedial alternatives	Small number of feasible remedial alternatives
5	Detailed cost analysis	Cost summary
6	Analysis and selection of remedial alternatives; preparaton of draft Proposed FS Report; meeting with USEPA.	Recommendation of most cost-effective remedial alternative(s); Proposed FS Report
7	Public participation program	Notice and brief analysis; opportunity for comment and public meeting
8	Discussion of changes; response to public comment	Final FS Report

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These tasks provide an administrative framework and a logical sequence of activities which facilitate the design and development of potential remedial alternatives and the rational selection of feasible and cost-effective alternative(s).

Interaction with Environ Corporation will occur or has occurred at several points in the FS process. Prior to Environ's Work Plan preparation, WCC provided Environ with all available RI site data to assist Environ in its baseline Risk Assessment. During Task 2, WCC will receive Environ's baseline Risk Assessment, and this report (and/or accompanying documents) will contain a definition of risks posed by the site, if any, and will assist in establishing the remediation objectives. WCC will then formulate appropriate general response actions. WCC will identify suitable technologies and will synthesize these technologies into potentially feasible remedial alternatives. After an initial screening of the alternatives, WCC will conduct a detailed technical evaluation of each alternative. In conjunction with WCC's technical study, Environ will examine these remedial alternatives and analyze the residual risks, if any, of each alternative and compare them to any risks associated with the implementation of each alternative. WCC will then incorporate Environ's analyses into a comparison of the remedial alternatives in terms of public health, environmental, technical, and cost-effectiveness concerns.

The proposed work outline provides for one meeting among "Services" and WCC in Michigan to discuss the progress of the FS, and one meeting among USEPA, "Services" and WCC in New York upon submission of the draft Proposed FS Report. Two additional meetings (or site visits) are also scheduled between WCC and Environ to coordinate our efforts.

2.2 SCOPE OF SERVICES

The scope of services includes nine tasks depicted in Figure 2-1 and in the table in the proceeding section. In addition to the technical tasks 1 through 8, a

project management task (Task 0) is needed so that effective administration and coordination among WCC, USEPA, "Services" and Environ can be maintained. Task 7 encompasses a public participation program intended to provide information to the community about the remedial alternatives and to promote public awareness. Each of these nine tasks is described in the following sections.

2.2.1 Task 0 - Project Management

The objective of the project management task is to facilitate the production, interpretation, and reporting of the information necessary to conduct a Feasibility Study that follows USEPA guidelines and sound engineering practices. The Project Manager will have primary technical responsibilities and the Assistant Project Manager will have primary administrative responsibilities. The technical responsibilities will include coordination and integration of the work of the various task leaders, presentation of findings to technical reviewers, and implementation of a program for quality assurance. The administrative responsibilities will include compliance with schedule, maintaining day-to-day communications with "Services", USEPA and Environ, and preparation of monthly progress reports. Technical and administrative activities are included under the subtasks described below. These subtasks will be active during the entire project and provide the necessary continuity for efficient progress of work.

Planning, Monitoring and Control of Schedule (Subtask 0.1)

This subtask includes tracking the progress of the project to facilitate the early detection of schedule or performance variances. Periodic progress meetings with Task Leaders will allow for review of schedule status, technical progress and performance, and noted variances from the proposed scope of services.

Technical Coordination of Work Activities (Subtask 0.2)

The Project Manager will track and control the work activities through the Task Leaders. It will be the responsibility of the Project Manager to apprise the Project Sponsor of the project status, and to schedule informal and formal peer review sessions.

Progress Reports (Subtask 0.3)

Progress reports will be sent monthly to USEPA and to "Services" summarizing project status. The reports may include:

- o updated summaries of project,
- o activities completed during the reported month by WCC and Environ Corp.,
- o problems encountered, including existing or expected schedule or performance variances, and
- o measures recommended in response to problems and their impact on project schedule and deliverables.

Technical and Management Review (Subtask 0.4)

The Technical Review Board will have responsibility for evaluating technical work and project deliverables. The technical review board for this project will consist of Daniel F. Predpall of WCC, Wayne, Steven James, of WCC, Walnut Creek, and G.J. Carty of Atkinson/Woodward-Clyde (Walsh Construction Company). The technical review board will also be available for meetings with regulatory agencies, and, if required, can provide senior level input for negotiations and technical discussions.

Dr. Melvin I. Esrig, the Project Sponsor, will provide management review and ensure that the Project Manager has the resources to complete the project.

File Maintenance (Subtask 0.5)

File maintenance will be directed and organized by the Project Manager. The Project Manager will delegate responsibility for daily maintenance to the Assistant Project Manager, who will maintain correspondence and category logs. The Assistant Project Manager will act as custodian of the project files and ensure that all items in project files are retrievable.

2.2.2 Task 1 - Work Plan

To be consistent with earlier discussions, proposals, and WCC project management, Task 1 was reserved for the development of this work plan.

2.2.3 Task 2 - Identification of General Response Actions and Related Activities

Task 2 encompasses the exchange of information between WCC and Environ and WCC's preliminary FS activities. WCC will provide Environ with site-specific information which will assist Environ in conducting a baseline Risk Assessment and in evaluating site conditions. Based on the Risk Assessment and other relevant factors, WCC will consider general response actions, or classes of response actions. These general response actions will serve as a framework for identifying suitable technologies in Task 3.

Upon completion of Environ's baseline Risk Assessment, WCC will review the Risk Assessment report and any associated documents provided by Environ. Based on an appraisal of actual or potential risks to human health and the environment and other relevant factors, the Risk Assessment will identify site conditions and

remediation objectives. WCC will consider the applicability of general response actions enumerated by USEPA[2] to the site conditions. In order to arrive at an appropriate family of technologies for potential application, a preliminary screening of general response actions will be conducted, as depicted hypothetically in Table 2-1.[3] This preliminary screening process represents the initial consideration given to general response actions that may be appropriate for the variety of conditions identified at the Ringwood site. The no-action response will be maintained as a baseline against which other measures will be compared.

2.2.4 Task 3 - Technology Screening and Synthesis of Alternatives

Identification of Potential Technologies (Subtask 3.1)

Under this subtask, all available technologies appropriate to each of the general response actions will be assembled. These technologies may include both conventional methods and innovative approaches. This master list of potentially feasible technologies is intended to be broad in scope; no screens are imposed at this point which might prematurely eliminate a feasible technology.

Screening of Technologies (Subtask 3.2)

Certain remedial technologies may address one or more of the specific site conditions and remediation objectives. Accordingly, WCC will compare general remedial technology categories to specific site conditions and describe whether a particular remedial technology category is applicable. As depicted hypothetically in Figure 2-2, specific technologies from each category will be identified that have the potential to successfully remediate specific site conditions.

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(2) U.S. Environmental Protection Agency, June, 1985. Guidance on Feasibility Studies Under CERCLA. EPA/540/G-85/003.

(3) Note that this table and all subsequent tables in this section are intended to illustrate approaches and formats which may be used in the FS. They represent hypothetical, generalized cases and not this particular site.

WCC will subject the master list of potentially feasible technologies to a screening process which will be used to identify appropriate technologies for subsequent incorporation into remedial alternatives. Each technology will be screened with respect to site characteristics, waste characteristics, and general technological limitations. For example, the large area of the Ringwood Mines site and the distribution of wastes on the site may prove to be important screening considerations. Technologies that are limited by or incompatible with physical, chemical or toxicological properties of the wastes will be considered unacceptable. Technologies which are judged to be too difficult to implement, require unreasonable lengths of time, or are based on inadequately proven methods will also be eliminated. A hypothetical technology screening matrix which illustrates a possible format for the screening process is included as Table 2-2.

Output from the technology screening process will consist of a list of the most feasible technologies for application at the Ringwood Mines site. This list will also enumerate the reasons for selecting a particular technology for potential application on different areas of the site. Specific site conditions identified through the initial risk assessment and the definition of the remediation objectives will guide the technology selection process.

Synthesis of Remedial Alternatives (Subtask 3.3)

WCC will assemble and describe complete remedial alternatives. These alternatives will be formed by selecting and combining the most feasible technologies into complete remedial alternatives for subsequent detailed evaluation. The synthesized remedial alternatives will be screened so that combinations in which all technologies not mutually compatible will be eliminated.

In addition to the range of treatment alternatives, a containment option involving little or no treatment and a no-action alternative will also be

developed. The no-action alternative may include provisions for environmental monitoring.

2.2.5 Task 4 - Evaluation of Remedial Alternatives

Task 4 is a detailed evaluation of the potential remedial alternatives generated in Task 3. Following an initial screening described below (Subtask 4.1), each alternative will be subjected to the evaluation criteria recommended by USEPA. WCC will conduct a technical feasibility evaluation, including engineering criteria and institutional requirements pertaining to implementation.

Screening of Remedial Alternatives (Subtask 4.1)

WCC will subject each remedial alternative to a screening process (Table 2-3). The preliminary screening will subjectively describe environmental and/or public health factors associated with each alternative, and preliminary ("order of magnitude") cost estimates (including capital costs and annual operation and maintenance costs, replacement costs, and a preliminary calculation of present worth). Environmental and public health considerations will be examined and alternatives that may have significant adverse impacts or that do not provide adequate protection of the environment or public health will be rejected. Implementation considerations, advantages and disadvantages of each alternative are considered in general terms for this alternative screening.

It is possible that the above factors could result in the elimination of alternatives which involve treatment of the source as a principal element. Because of the complex hydrogeological nature of the Ringwood Mines site and the low level of contamination observed during the RI, source treatment options may be judged to be infeasible within the scope of this screening step. We recognize that the FS must explain the rationale for eliminating source treatment options at this point.

WCC will carry both the containment option involving little or no treatment and the no-action alternative through this preliminary screening process in order to compare these options with the other alternatives. The preliminary alternative screening process will define those alternatives that provide satisfactory contaminant source control or contaminant migration control at the site. It will also eliminate alternatives that are more costly than others without providing significantly greater reliability or public health benefits.

Technical Evaluation Study (Subtask 4.2)

Following the preliminary alternative screening process, WCC will conduct a technical feasibility evaluation of each alternative. Only those alternatives which emerge from the preliminary screening process will be subjected to the technical feasibility evaluation. WCC will not carry through meaningless or infeasible alternatives into the detailed evaluation stages.

Each screened remedial alternative will be evaluated on the basis of performance, reliability, implementability and safety. A sample hypothetical technical evaluation is presented in Table 2-4. The technical evaluation may consider the advantages and/or limitations of each alternative with respect to characteristics such as:

- the effectiveness in providing adequate source control or contaminant migration control,
- the useful life of each alternative,
- the availability and implementability of technologies employed by each alternative,
- the technical, administrative, and institutional ability to monitor, maintain, and replace technologies over time,

- o demonstrated performance under similar working conditions,
- o temporary storage requirements, off-site disposal needs, transportation plans, and collateral risks associated with such options,
- o effectiveness with respect to minimizing the volume, toxicity and mobility of contaminants,
- o time to implement and achieve beneficial results,
- o special requirements necessary to protect worker safety,
- o compatibility with land use in area, and
- o special site preparation requirements.

WCC will be responsible for providing Environ with a description of the remedial alternative options and technical data pertaining to the engineering effectiveness of each alternative with respect to source containment, source removal, and/or migration control. In a parallel investigation, Environ will conduct a Risk Assessment of each remedial alternative, which will address the short and long-term residual risks and other health and safety and environmental concerns associated with the implementation of each alternative. Results of this assessment will provide an evaluation of the adequacy of each alternative in protecting human health and the environment.

Evaluation of Institutional Requirements (Subtask 4.3)

Under this subtask, each remedial alternative will be evaluated with respect to regulations, standards and criteria that may apply to its design, operation, timing or permitting. Each alternative will also be evaluated with respect to its

attainment of applicable or relevant and appropriate standards, limitations, criteria and requirements (ARARs) (SARA Section 121). These may potentially include:

- o Toxic Substances Control Act (TSCA),
- o Safe Drinking Water Act (SDWA),
- o Clean Air Act (CAA),
- o Clean Water Act (CWA), and
- o Resource Conservation and Recovery Act (RCRA).

Additional institutional requirements which may apply to on- or off-site disposal or treatment of wastes, discharge to air, surface water or ground water, transportation of wastes, storage of wastes or land use limitations, may include but not be limited to:

- o USEPA Office of Solid Waste Hazardous Waste Regulations (RCRA Subtitle C, 40 CFR Part 264) regarding landfill closures,
- o USEPA Office of Water Quality Pretreatment Standards for discharge of water into publicly owned treatment works (POTW),
- o CWA National Pollutant Discharge Elimination System (NPDES) permitting requirements,
- o DOT Hazardous Materials Transport Rules,
- o NJDEP Hazardous Waste Classification Requirements,

- OSHA requirements,

- County or local ordinances and regulations,

- Conservation of Wildlife Resources, and

- NJDEP Division of Water Resources requirements for well installation.

WCC will also analyze whether alternate concentration limits (ACLs) would be applicable at the Ringwood Mines site. With respect to ACLs and ARARs, WCC will evaluate whether:

- the remedial action is only part of a total remedial action that will attain such level or standard of control when completed;

- compliance with such requirements will result in greater risk to human health and the environment than alternative options;

- compliance with such requirements is technically impracticable from an engineering perspective;

- the remedial action selected will attain a standard of performance that is equivalent to that required under the otherwise applicable standard, requirement, criteria, or limitation, through use of another method or approach;

- the State has consistently applied (or demonstrated the intention to consistently apply) the standard, requirement, criteria, or limitation in similar circumstances at other remedial actions within the State; or

- the remedial action that attains such level or standard of control will provide a balance between the need for protection of public health and

welfare and the environment at the site under consideration, and the availability of amounts from the Fund to respond to other sites which present or may present a threat to public health or welfare or the environment, taking into consideration the relative immediacy of such threats.

Summary of Feasible Remedial Alternatives (Subtask 4.4)

WCC will review Environ's environmental and public health evaluation of the remedial alternatives, and will integrate this information into a summary assessment of the alternatives. The baseline Risk Assessment conducted by Environ will serve as a basis for comparing the no-action alternative since it evaluates the public health and environmental concerns in the absence of any remediation. WCC will develop a summary that will compare the remedial action alternatives on the following bases:

- o public health concerns;
- o environmental concerns;
- o technical concerns; and
- o cost-effectiveness concerns.

This summary will be merged with the results of the cost analysis (Task 5) to form a final table or decision matrix as part of Task 6.

2.2.6 Task 5 - Cost Analysis

WCC will conduct a detailed economic comparison of those alternatives that survive the preliminary alternative screening and technical feasibility evaluation processes. Costs for the no-action alternative will be included if monitoring is specified. WCC will utilize standard cost estimating techniques and sources, including published cost estimating references, vendor quotes, and engineering

experience. For each technically feasible and environmentally acceptable alternative for each site, WCC will estimate the following cost parameters:

- o capital costs (to include construction costs, engineering, legal/fiscal and contingencies);
- o annual operation and maintenance (O&M) costs;
- o replacement costs over the anticipated life of the remedial action;
- o present worth costs; and
- o costs of collateral environmental risks associated with implementation of the alternative.

WCC will perform an economic sensitivity analysis on the same alternatives for the site that have been subjected to the detailed economic evaluation process. This economic sensitivity analysis will point out factors which could influence ultimate alternative selection based upon economic factors alone. Table 2-5 presents a hypothetical economic sensitivity analysis that focused on variations in aquifer permeability which influenced the discharge rate from a ground water recovery system to a public sewer system (POTW).

2.2.7 Task 6 - Proposed FS Report

Report Preparation (Subtask 6.1)

WCC will summarize the feasibility evaluations and present the results in the form of a decision matrix. This decision matrix will be a comparison of the remedial alternatives on the basis of public health, environmental, technical, and economic concerns. Table 2-6 presents a sample format for the summary evaluation.

WCC will recommend alternative(s) which most cost-effectively provide the necessary degree of either contaminant source control or contaminant migration control (or some combination of both) for the Ringwood Mines site. The

recommendations will include a more extensive discussion of the alternative(s), and may include:

- o a further discussion of what the recommended remedial alternative will and will not accomplish;
- o a further discussion of site-specific operation, maintenance, and monitoring requirements with related cost estimates;
- o specific recommendations for any off-site disposal requirements and quotations from potential TSD facilities;
- o a further discussion of implementation factors including scheduling and public participation considerations; and
- o recommendations for the design and implementation of a land use plan by the Borough of Ringwood.

WCC will prepare the summary and recommendations in the form of a fully-documented draft Proposed FS Report, which will also include a complete discussion of all work performed pursuant to this FS.

Report Revision (Subtask 6.2)

WCC will meet with USEPA, Environ, and "Services" to review any questions or comments regarding the draft Proposed FS. WCC will subsequently incorporate responses to USEPA's comments in a Proposed FS Report.

2.2.8 Task 7 - Public Participation

A public information program will be undertaken which fulfills the requirements of SARA. The program will provide for public notice and review of

the Proposed FS Report, and will provide an opportunity for submission of written and oral comments and an opportunity for a public meeting at or near the site. A transcript of the meeting will be taken and made available to the public.

WCC's contributions may include but not be limited to:

- o preparation of project briefings and fact sheets,
- o preparation of graphics materials, and
- o attendance at a public meeting.

2.2.9 Task 8 - Final FS Report

WCC will prepare a Final FS Report which will respond to the significant comments, criticisms, and new data submitted by the public in written or oral presentations. The Final FS Report will be accompanied by a discussion of the changes from the Proposed FS and the reasons for any such changes.

2.3 WCC QUALITY ASSURANCE PROGRAM

All work on the Ringwood Mines Feasibility Study will be performed in strict accordance with Woodward-Clyde Consultants' formal company-wide Quality Assurance Program. This program establishes lines of responsibility and accountability, defines methods of operations and documentation of activities, and establishes internal auditing procedures. Peer review is an integral part of all professional services rendered by WCC and is routinely conducted in daily practice. The Technical Review Board and other peer reviewers will check that satisfactory performance is evident on the following items:

- o conformation to required scope and definition of service,

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- o basic field and laboratory data,
- o references, documents and correspondence in files,
- o assumptions, technical approaches and solutions,
- o checking of calculations, drawings, graphs and tables,
- o organization, clarity and completeness of report, and
- o applicability and completeness of stated limitations of the technical work.

Peer review, as well as other WCC quality assurance control procedures, will be enforced for all reduction of data, analysis of data, and development of designs, drawings, recommendations, and conclusions.

The Project Sponsor will have the overall responsibility for verifying that the quality of work performed is in accordance with acceptable professional standards. The daily implementation of the quality assurance program will be the responsibility of the Project Manager. All staff members working on the Ringwood Mines Feasibility Study, whether with technical or administrative duties, will be responsible for performing their specific assignments in accordance with applicable requirements of the quality assurance program.

TABLE 2-1
HYPOTHETICAL SAMPLE OF GENERAL REPONSE ACTIONS SCREENING

General Response Action	Technologies	Purpose	Applicable	Not Applicable	May be Applicable
No Action	Some monitoring and analyses may be performed.	Leave site as it is	X		
Containment	Capping; ground water containment barrier walls; bulkheads; gas barriers.	Isolate contaminants from the environment and prevent them from leaving the site.			X
Pumping	Ground water pumping; liquid removal; dredging.	Lower the water table to minimize contact of ground water with surface contaminant sources; extract contaminated ground water.			X
Collection	Sedimentation basins; French drains; gas vents; gas collection systems.	Extract leachate or contaminated ground water; release gases.			X
Diversion	Grading; dikes and berms; stream diversion ditches; trenches; terraces and benches; chutes and downpipes; levees; seepage basins.	Rechannel surface runoff or streams to avoid contact with contaminants			X
Complete Removal	Tanks; drums; soils; sediments; liquid wastes; contaminated structures; sewers and water pipes.	Remove all contaminant sources and prevent further discharge of contaminants into environment.		X	
Partial Removal	Tanks; drums; soils; sediments; liquid wastes.	Remove contaminant sources and minimize contaminant discharge into environment.	X		

TABLE 2-1 CONT'D
HYPOTHETICAL SAMPLE OF GENERAL REPONSE ACTIONS SCREENING

General Response Action	Technologies	Purpose	Applicable	Not Applicable	May be Applicable
On-Site Treatment	Incineration; solidification; land treatment; biological, chemical, and physical treatment.	Reduce mass of contaminated material by destroying chemical or converting it to non-toxic or less toxic form.			X
Off-Site Treatment	Incineration; biological, chemical, and physical treatment.	Same as above but requires bulk removal from site.			X
In-Situ Treatment	Permeable treatment beds; bioreclamation; soil flushing; neutralization; land farming.	Reduce contaminant levels via non-disruptive processes that treat the wastes in place.			X
Storage	Temporary storage structures.	Temporary storage of contaminated material.			X
On-Site Disposal	Landfills; land application.	Dispose contaminated source material at on-site location that minimizes pathways to environment.		X	
Off-Site Disposal	Landfills; surface impoundments; land application.	Dispose contaminated source material away from site.	X		
Alternative Drinking Water Supply	Cisterns; above ground tanks; deeper or upgradient wells; municipal water system; relocation of intake structure; individual treatment devices.	Reduce health risks to local residents.			X
Relocation	Relocate residents temporarily or permanently.	Reduce health risks to local residents.		X	

TABLE 2-2
HYPOTHETICAL SAMPLE OF SCREENING OF
POTENTIALLY FEASIBLE TECHNOLOGIES

Technology	Site-Specific Technical Considerations: Compatibility With Site Conditions	Compatibility With Waste Characteristics	General Technology Limitations
1. Capping			
1A. Sand/Soil Cover	Easily placed over site surface. Source boundaries not clearly defined.	Permeable to emissions and precipitation Sand should minimize upward capillary movement of contaminants	Proven - common fill placement procedures
1B. Clay/Soil	Easily placed over site surface. Source boundaries not clearly defined. Drainage of soil layer difficult	Possible upward capillary movement; requires vent layer	Compaction QA/QC, cracking from wet-dry cycles
1C. Asphalt (Bituminous Concrete)	Extensive site preparation; not compatible with land use in area	Generally compatible; requires vent layer	Proven - common paving procedures
1D. Double FML (Flexible Membrane Liner)/Soil	Tie-in to existing site structures somewhat difficult; extensive site preparation required	HDPE compatible; requires vents; probably most effective contaminant isolation cap	QA/QC of seams

HYPOTHETICAL SAMPLE OF PRELIMINARY ALTERNATIVE SCREENING MATRIX

Alternative	Environmental/ Public Health Factors	Cost Factors: Capital ($10^6)	Cost Factors: Annual O&M ($1,000)	Present Worth* ($10^6)	Implementation Factors	Advantages	Disadvantages
1 - No Action	o No control of contaminant sources or pathways	0.1	70	0.66	o Monitoring only	o Least Expensive o No exposure risk from removal	o Long-term monitoring may be required
2A - Limited Source Containment/ Soil Cap	o Contaminant sources are isolated from direct contact by public o Minimal control of ground-water pathway o Limited control of air-emissions from wastes	3.5	90	4.3	o Minimal construction requirements o Minimal permitting o Could probably be implemented in 1 year or less	o Easily implemented o Moderate cost	o Probably not a long-term solution because migration of contaminants from fill source is not adequately controlled
2B - Limited Source Containment/FML	o Key contaminant sources are isolated from direct contact by public o Minimal control of ground water pathway (slight improvement over No. 2A because cap is less permeable) o Improved control of air emissions from wastes (as compared to No. 2A)	4.5	80	5.3	o Cap construction requires adequate quality control procedures o Minimal permitting o Could probably be implemented in 18 months	o Moderate cost o Improved isolation of contaminants in fill from public (compared to Alt. 2A)	o May not represent a long-term solution to ground water contaminant migration problem
3A - Pump and Treat	o Could possibly draw contaminants downward o Limited control of air emissions from waste o Should control migration o of contaminants off site	4.5	190	6.3	o Significant construction requirements o Moderate permitting requirements for treatment plant (NPDES) and hydraulic barrier well(s) o Could probably be implemented in 18 months or less	o Controls migration of contaminant plume off site	o High Cost o Does not remediate source contaminants o May require long-term pumping and treating of ground water
3B - Shallow Containment/ Pump and Treat	o Key contaminant sources are isolated from direct contact by public o Migration of contaminants from wastes is controlled	5.0	242	7.3	o Bedrock obstructions and num erous utility crossings complicate physical barrier installation o Moderate permitting requirements for treatment plant (NPDES)	o Capable of removing most of potentially mobile contaminants from sources	o High cost o May require long-term pumping and treating of ground water

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TABLE 2-4

HYPOTHETICAL SAMPLE OF
TECHNICAL FEASIBILITY EVALUATION SUMMARY

		Performance		Reliability	
No.	Alternative	Effectiveness	Useful Life	Operation and Maintenance Requirements	Possible Failure Modes
3	Cap, Hydraulic Barrier-Points, POTW, Monitor	Only moderately effective for source control of VOC contaminants from the site.	30 + years	-Maintain cap -Operate/maintain 11± pumps -Quarterly monitoring of ground water -Monitor discharge to POTW	-Cap failure from lack of maintenance -Zone of influence may not capture adequate VOC contaminants -Must have reliable electric power supply
4	Cap, Curtain Drain, POTW, Monitor	Moderately effective control source of VOC contaminants by maintaining water table depression	30 + years	-Maintain cap -Operate/maintain 1 pump -Quarterly monitoring of ground water -Monitor discharge to POTW	-Cap failure from lack of maintenance -Crushing/clogging of drain lines -Needs electric power

TABLE 2-4 CONT'D

HYPOTHETICAL SAMPLE OF
TECHNICAL FEASIBILITY EVALUATION SUMMARY

		Implementability			
		Constructability		Time	
No.	Alternative	Site Conditions	Conditions External to Site	To Implement	To See Desired Results
3	Cap, Hydraulic Barrier - Points, POTW, Monitor	Access, soils and topography amenable to construction	No known limitations	6 months	6 months to 1 year
4	Cap, Curtain Drain, POTW, Monitor	Access, soils and topography amenable to construction	No known limitations	6 months	6 months to 1 year

TABLE 2-4 CONT'D

HYPOTHETICAL SAMPLE OF
TECHNICAL FEASIBILITY EVALUATION SUMMARY

No.	Alternative	Worker Safety[4]
3	Cap, Hydraulic Barrier-Points, POTW, Monitor	Standard construction safety precautions required; Level D personal protection
4	Cap, Curtain Drain, POTW, Monitor	Standard construction safety precautions required; Level D personal protection.

[4] Health and safety considerations of neighboring communities and facilities will be addressed by Environ.

TABLE 2-5
HYPOTHETICAL SAMPLE OF
ECONOMIC SENSITIVITY ANALYSIS

	Item	No.3 Cap - Hydraulic Barrier - Well Points - POTW - Monitor	No.4 Cap - Curtain Drain - POTW - Monitor
A.	OFF-SITE FLOW AT PERMEABILITY OF 10^{-3}cm/sec		
	(GPM)	11.5	26.4
1.	Annual Sewer Use Charge @ $0.0038/gallon	$ 23,000	$ 52,000
2.	Percent of Total Annual O&M	53	73
3.	Alt. Present Worth ($1,000)	$ 875	$ 1,082
4.	Rank (lowest to highest P.W.)	1	2
B.	OFF-SITE FLOW AT PERMEABILITY OF 10^{-4}cm/sec		
	(GPM)	1.1	2.6
1.	Annual Sewer Use Charge @ $0.0038/gallon	$ 2,200	$ 5,200
2.	Annual O&M Cost	$ 22,200	$ 24,200
3.	Percent of Total Annual O&M	10	21
4.	Alt. Present Worth ($1,000)	$ 679	$ 641
5.	Rank (lowest to highest P.W.)	2	1

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TABLE 2-6
HYPOTHETICAL SAMPLE OF
ALTERNATIVES COMPARISON SUMMARY

	Public Health Concerns		Environmental Concerns		Technical Concerns		Cost		
Alternative	Advantages	Disadvantages	Advantages	Disadvantages	Advantages	Disadvantages	Capital (10^6)	Annual O&MM ($1,000)	Present Worth (10^6)
1 No Action	o No exposure risks from removal or redisposal	o No control of contaminant sources or pathways	o No exposure risks from removal or redisposal	o No control of contaminant sources or pathways	-	-	-	12	.1
2A Limited Source Containment; soil cap	o Sources are isolated from direct contact by public or vectors o Reduces release potential of VOCs to ground water pathway	o May not adequately control VOC contamination of ground water	o Reduces infiltration of precipitation through wastes	o Limited control of air emission from wastes o Not a permanent solution o Possible failure from lack of maintenance	o Easily implemented o Minimal permitting required	o Soil cap requires long-term maintenance o Cap construction requires adequate quality control procedures	3.5	90	4.3
3B Pump and Treat	o Improvement of ground water quality o Controls migration of contamination off-site	o May require long-term pumping and treating o Some risks associated with removal of waste water	o Controls further migration of contaminant plume	o Could possibly draw contaminants downward o Does not remediate source contaminants	o Could be implemented in 18 months or less	o Significant construction requirements o May require additional characterization of aquifer properties	4.5	190	6.3

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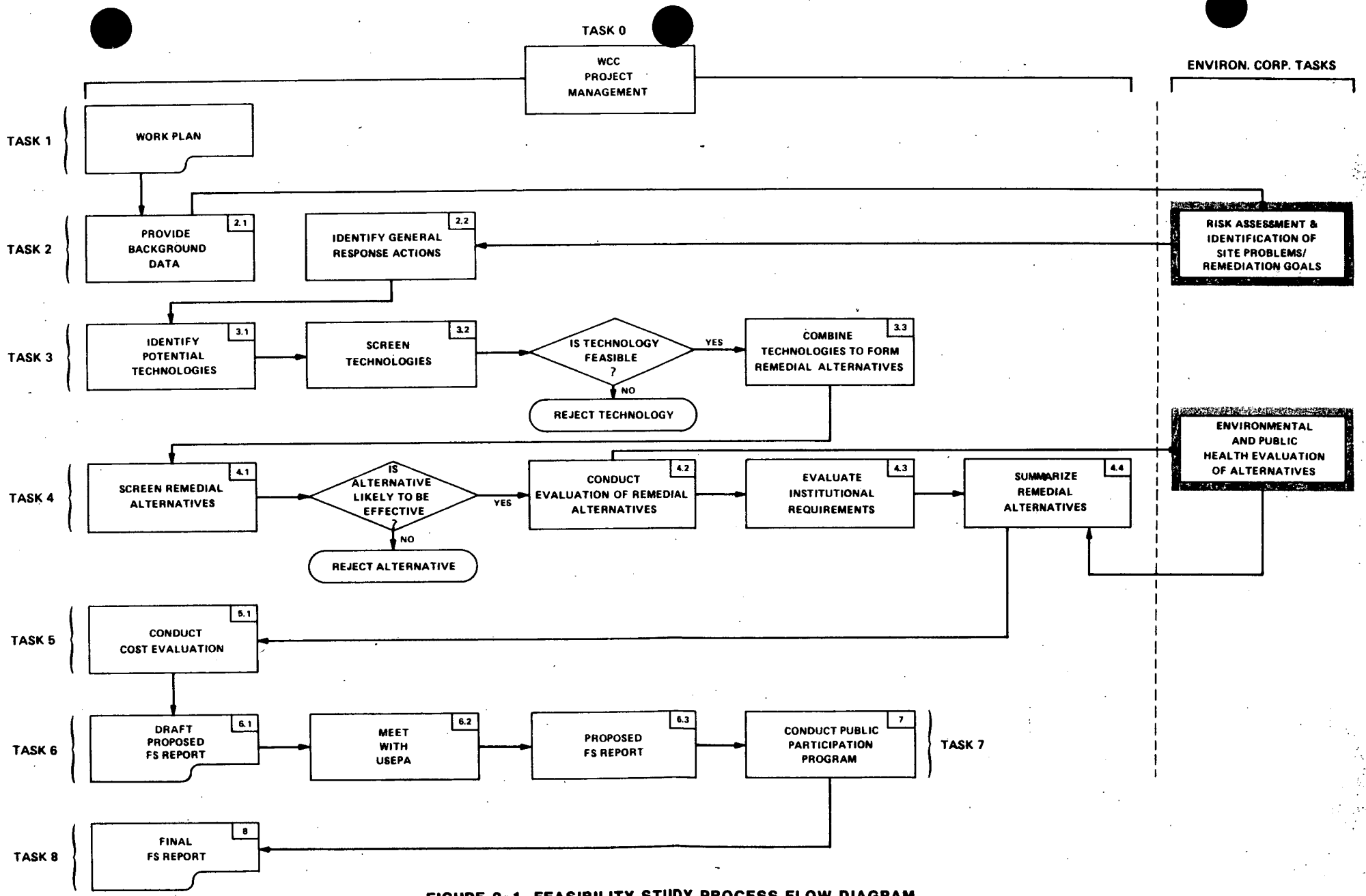

FIGURE 2-1 FEASIBILITY STUDY PROCESS FLOW DIAGRAM

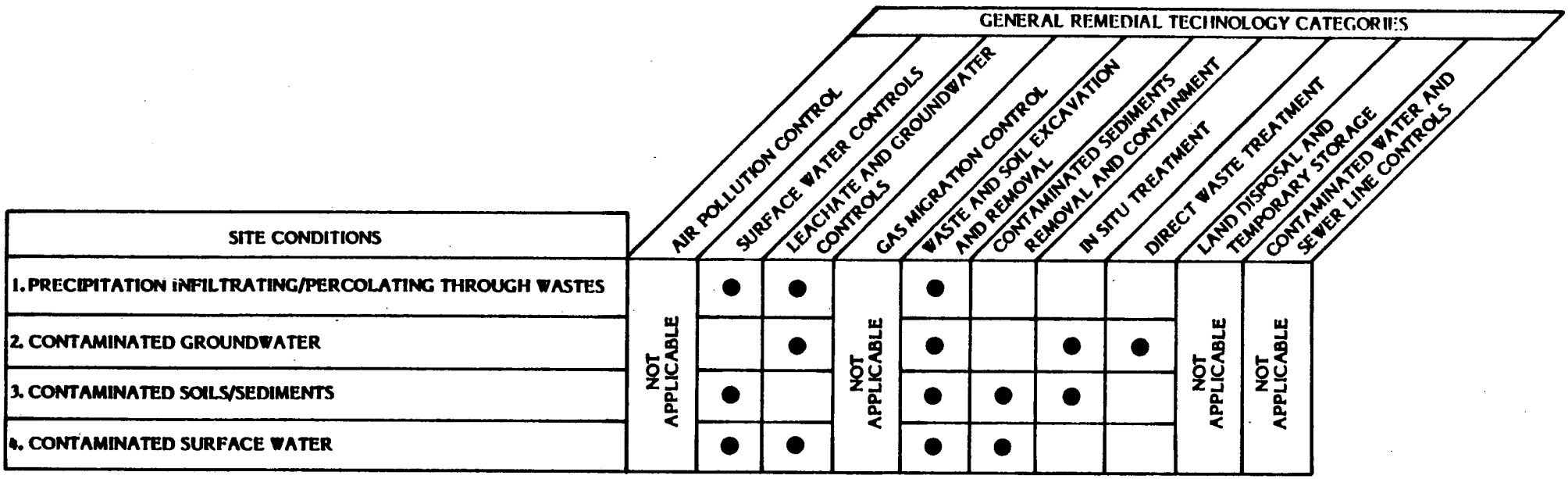

FIGURE 2-2

HYPOTHETICAL SAMPLE OF APPLICATION OF GENERAL REMEDIAL TECHNOLOGY CATEGORIES TO SITE CONDITIONS

SECTION 3
PROJECT SCHEDULE AND DELIVERABLES

Woodward-Clyde Consultants is prepared to initiate this project as soon as notice of authorization to work is received and as soon as a Risk Assessment final report is received from Environ Corp.

A project schedule is shown in Figure 3-1. The project schedule illustrates the interface between WCC and Environ Corp. activities. The estimated time for completion of WCC's FS tasks is 36 weeks. This includes an estimated 6 weeks for notification, and for USEPA and public review and comment of the Proposed FS Report. If USEPA review of interim documents is more lengthy than estimated, the project schedule will be adjusted accordingly.

This project schedule may be revised subject to USEPA review of the work plan.

Project deliverables include a Proposed FS Report and a Final FS Report. Monthly progress reports will be prepared by WCC which will report both WCC's and Environ's activities.

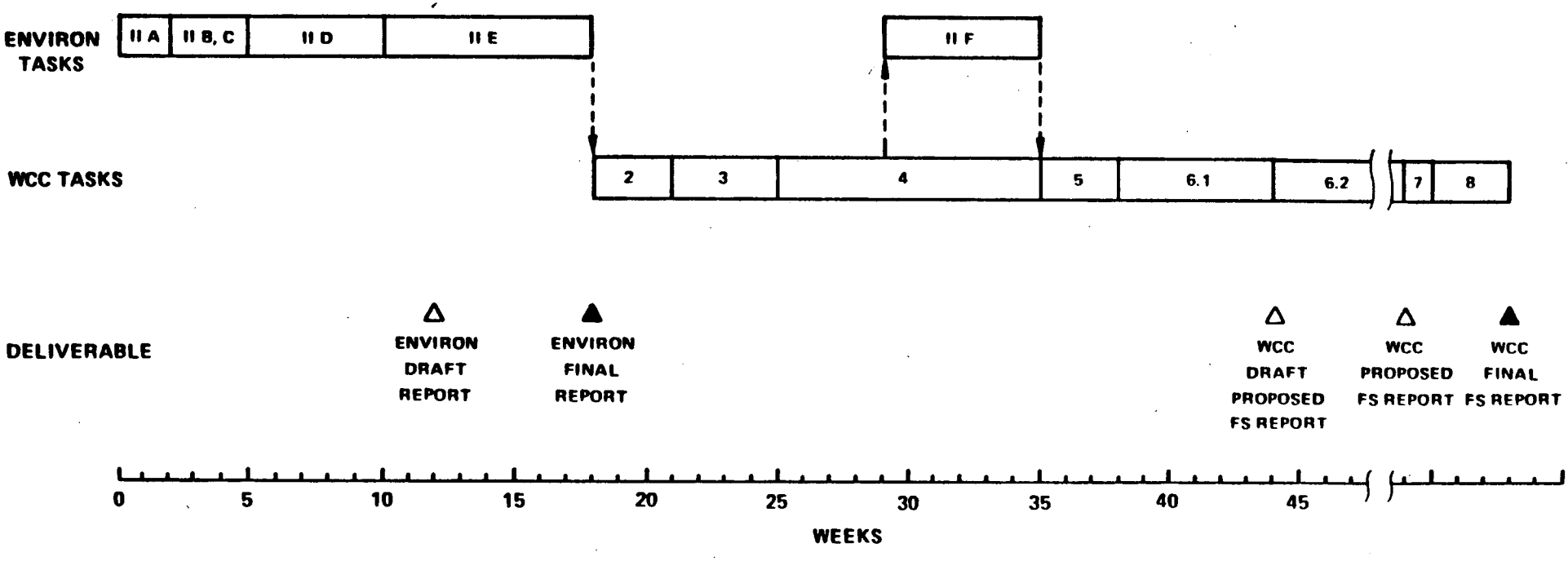

FIGURE 3–1 PROJECT SCHEDULE AND DELIVERABLES